

Smart Valve Positioner 700 Series with FOUNDATION fieldbus

Model AVP703

OVERVIEW

The model AVP703 is a FOUNDATION fieldbus equipped smart valve positioner.

The model AVP703 controls and manages the valve through Fieldbus.

Various diagnostic functions and the automatic configuration function of the 700 series, as well as PID function blocks, bring out real fieldbus advantages.

FEATURES

Easy to use

• **Auto- setup**

The auto-setup function is a fully-automatic configuration program that specifies the actuator and adjusts zero and span of the valve. The program can be run with the simple operation of an external switch so that the adjustments of the valve can be quickly and safely performed in hazardous areas.

Valve diagnostics

Following parameters can be monitored by Control Valve Maintenance Support System "Valstaff".

- Stick Slip
- Total Stroke
- Travel Histogram
- Cycle Count
- Shut-Off Count
- Max. Travel Speed
- Valve signature
- Full stroke test

High reliability

• **Positive seating**

The positive seating function completely shut off the valve when the input signal is lower than that set by user. This allows full play to the shut-off capability of the valves.

• **Self-diagnostics**

The self-diagnostic function provides the ability to check the status of the positioner and to alert the failure.

Single model for multiple specifications

The model AVP703 settings can be changed without any replacement of changing of parts. A single model



can be modified to suit any application without any parts change.

- Flow characteristic: Linear, EQ%, Quick opening or user customized characteristics
- Actuator type: Double or single acting actuator

Fieldbus Functions

• **Transducer Block**

Positioner Transducer Block (FF-906 compliant)

• **Link master function**

This device supports Link Active Schedule function for control of fieldbus communication.

• **Alarm function**

Alarm functions specified by FOUNDATION fieldbus specifications are supported, such as various high or low alarms, block alarm notices, etc. Alarms are output in compliance with NAMUR NE107.

China RoHS

This device is used in the Oil & Gas, Petrochemical, Chemical, Pulp & Paper, Food & Beverage, Machinery, Steel/Metal & Mining, and Automobile industries and therefore does not fall under the China RoHS Legislation.

If this device is used in semiconductor manufacturing equipment, labeling on the device and documents for the China RoHS may be required. If such documents are required, consult an azbil corp. representative.

FUNCTIONAL SPECIFICATIONS**Applicable actuator**

- Single and double acting actuator
- Linear and rotary motion actuator

Approvals**ATEX Flameproof and Dust approval**

II 2 G Ex d IIC T6 Gb at $-30^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$
 II 2 D Ex tb IIIC T 85°C Db $-30^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$
 IEC IP66

IECEx Flameproof and Dust approval

Ex d IIC T6 Gb $-30^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$ IP66
 Ex tb IIIC T85°C Db $-30^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$ IP66

Output characteristics

- Linear, Equal percentage, Quick opening
- Custom configurable 21 segments

Stem travel range

Feedback Lever Angle $\pm 4^{\circ}$ to $\pm 20^{\circ}$

Bypass operation

Auto/Manual external Switch (For single acting type only)

Air supply pressure

140 to 700 kPa {1.4 to 7.0 kgf/cm²}

Air consumption

at the stable output 50%

3.2 ℓ/min (N) maximum at 140 kPa {1.4 kgf/cm²}

4.0 ℓ/min (N) maximum at 280 kPa {2.8 kgf/cm²}

4.8 ℓ/min (N) maximum at 500 kPa {5.0 kgf/cm²}

8 ℓ/min (N) maximum at 400kPa {4.0kgf/cm²}

for double acting type

Maximum air deliver flowrate

110 ℓ/min (N) at 140 kPa {1.4 kgf/cm²}

Lightning protection

Peak value of voltage surge: 12 kV
 Peak value of current surge: 1000 A

Vibration tolerance

2 G (5 to 400 Hz)
 (with standard mounting kit on Azbil Corporation HA actuator)

Ambient temperature limits

Waterproof: -40°C to $+80^{\circ}\text{C}$ (LCD: 0 to $+50^{\circ}\text{C}$)
 ATEX Flameproof: -30°C to $+75^{\circ}\text{C}$
 IECEx Flameproof: -30°C to $+75^{\circ}\text{C}$

CE conformity**Electromagnetic compatibility**

EN61326-1: 2013 (CE marking)

Ambient humidity limits

5% to 100% RH

PERFORMANCE SPECIFICATIONS**Accuracy**

$\pm 1\%$ F.S. ($\pm 2.5\%$ with custom output characteristics)

PHYSICAL SPECIFICATIONS**Enclosure rating**

JISC0920 watertight, IP66

Finish

Baked acrylic

Color

Silver

Material

Cast aluminum

Weight

Without Pressure regulator with filter : 4.2 kg
 With Pressure regulator with filter : 4.9 kg

INSTALLATION**Air connections**

Rc1/4 or 1/4NPT internal thread

Electrical connections

G1/2, 1/2NPT or M20 \times 1.5

Conditions of supply air (JIS C1805-1 (2001))**Particles**

Maximum diameter 3 μm

Oil mist

Less than 1 ppm at mass

Humidity of the air supply

The dew point should be at least 10°C lower than the temperature of this device.

FIELDBUS SPECIFICATIONS

Function Blocks

Block name	Number	Period of execution (ms)	Note
AO	1	30	For Set Point
DI	2	30	For limit switches
AR	1	30	Arithmetic block perform an arithmetical operation to the process measurement value.
PID	2	45	PID function block execute a control algorithm to minimize the error as the difference between a measured process variable and desired set-point. It also has functions of cascade control, feed forward control, and alarm detection.
OS	1	30	Output splitter block perform the split control operation.
IS	1	30	Input selector block perform the control of select the process value.

VCR Structure

The AVP has 32 VCRs (Virtual Communication Relationships), of which the first one is dedicated to the SMIB/NMIB defined by the Foundation Fieldbus specifications. The rest of the VCRs are fully configurable.

VCR No.	Configuration
1	QUB (Server) for NMIB/SNIB
2-32	Fully configurable

Network Parameters

The following table shows the key parameter values that affect interoperability of the Fieldbus devices. The LAS needs to be configured to satisfy these parameters. If other devices on the same Fieldbus network require a greater number for them, the greater number must be used. This will degrade network performance, though.

Symbol	Parameter	Factory Setting	Range of Value
V (ST)	Slot Time *1	5	5 to 100
V (MID)	Minimum Inter PDU Delay *1	10	10 to (V(MRD)-1)×V(ST), smaller than 120 inclusive.
V (MRD)	Maximum Response Delay *2	4	V(MRD)×V(ST) shall be greater than 20 and V(MRD) shall be smaller than 11, inclusive.
T1	SM Step Timer	48000 (15 seconds)	---
T2	SM Set Address Sequence Timer	2880000 (90 seconds)	T2 > T3
T3	SM Set Address Wait Timer	1440000 (45 seconds)	T2 > T3
V (FUN)	First Unpolled Node	0x25	0x14 to 0xF7
V (NUN)	Number of consecutive Unpolled-Node	0xBA	0x00 to 0xE4
V(MSO)	Maximum Scheduling Overhead *1	0x00	0x00 to 0x 3F
V(DMDT)	Default Minimum Token Delegation time *1	0x56	0x20 to 0x7FFF
V(DTHT)	Default Token Holding Time *1	0x0400	0x0114 to 0xFDE8 (65,000)
V(TTRT)	Target Token Rotation Time *1	4096	1 to 60000ms
V(LTHT)	Link Maintenance Token Holding Time *1	0x0124	0x0124 to 0xFDE8 (65,000)
V(TDP)	Time Distribution Period	5000	5 to 55000ms
V(MICD)	Maximum Inactivity to Claim LAS Delay *1	2000	1 to 4095
V(LDDP)	LAS Database Distribution Period	3000	100 to 55000ms

- Note)
- A LAS requires parameters other than those listed here to operate. Please refer to the user's manual that comes with your LAS device.
 - The T3 needs to be set between 15 seconds and 60 seconds.
- *1. The unit is octet time (256 μ s).
Octet time is the time required to handle 8 bits of data on the Fieldbus Network.
- *2. The unit is slot-time.

Supply voltage

9 to 32 V

Maximum Current 20 mA

Registration

Interoperability test ITK 6.1 approved.

Typical installation

Figure 1 shows the wiring for the model AVP703.

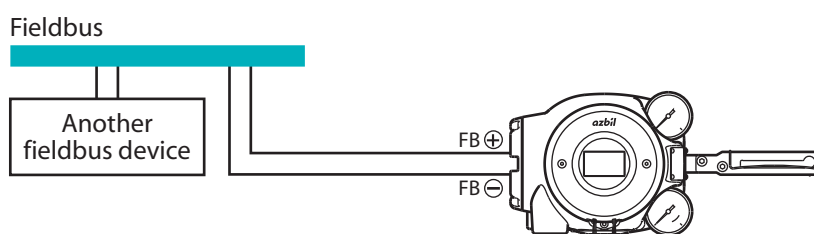


Figure 1 **Wiring for model AVP703**

MODEL SELECTION

AVP703		FOUNDATION Fieldbus				-	(1)	(2)	(3)	-	(4)	(5)	(6)	(7)	-	(8)	(9)
(1) Structure		Water-proof					X										
		ATEX Flameproof (Electrical connection G1/2 is not available)					C										
		IECEx Flameproof (Electrical connection G1/2 is not available)					D										
(2) Connection		Electrical connection	Air piping connection	Mounting thread	Pressure gauge thread												
		G1/2	Rc1/4	M8	Rc1/8		G										
		1/2NPT	1/4NPT	M8	Rc1/8		N										
		1/2NPT	1/4NPT	5/16-8UNC	Rc1/8		U										
		M20 x 1.5	1/4NPT	M8	Rc1/8		M										
(3) Finish		Standard (Baked acrylic)					S										
		Corrosion proof (Baked urethane)					B										
(4) (5) Display		Display with push button									D	X					
(6) (7) Diagnostic		Advanced Diag (with four pressure sensors)											A	X			
(8)(9) Option		None					X									X	X
		Model KZ03 pressure regulator with filter (Mounted on Positioner)					M									1	
		Model KZ03 pressure regulator with filter (with bracket for separated mount)					M									2	
		Extension lever (In case of no mounting bracket)					M									L	
		Seal tape prohibited					M									J	
		Mounting bracket material SUS316 (In case of with mounting bracket)					M									6	
		Mounting bracket (PSA1, 2)					Y									S	
		Mounting bracket (PSA3, 4)					Y									Q	
		Mounting bracket (PSA6, VA4 to 6)					Y									L	
		Mounting bracket (PSA7)					Y									8	
		Mounting bracket (HA1)					Y									A	
		Mounting bracket (HA2, HL2)					Y									T	
		Mounting bracket (HA3, HL3)					Y									C	
		Mounting bracket (HA4, HL4)					Y									N	
		Mounting bracket (DAP560, 1000, 1000X)					Y									4	
		Mounting bracket (DAP1500, 1500X)					Y									5	

Individual specifications

- PD_TAG (max 32 character): _____
- NODE_ADDRESS:0x _____
- Input Characterization:
 - Linear (Standard), Equal percentage, Quick opening, User-defined
- Positioner action:
 - Direct (Single acting actuator), Reverse (Single acting actuator), Double acting actuator
- Supply pressure classification:
 - 150 < PS ≤ 300 kPa (Standard)
 - 140 ≤ Ps ≤ 150 kPa, 300 < Ps ≤ 400 kPa, 400 < Ps ≤ 450 kPa, 450 < Ps ≤ 700 kPa
- Unit of pressure gauge:
 - kPa (Standard), MPa, bar, psi, kgf/cm²
- Valve closed position:
 - DOWN (Standard), UP
- Actuator type:
 - Linear (Standard)
 - Rotary 90, Rotary 60, Rotary sub90, Rotary sub 60

DIMENSIONS

Shows the typical dimensions of AVP703.

[Unit: mm]

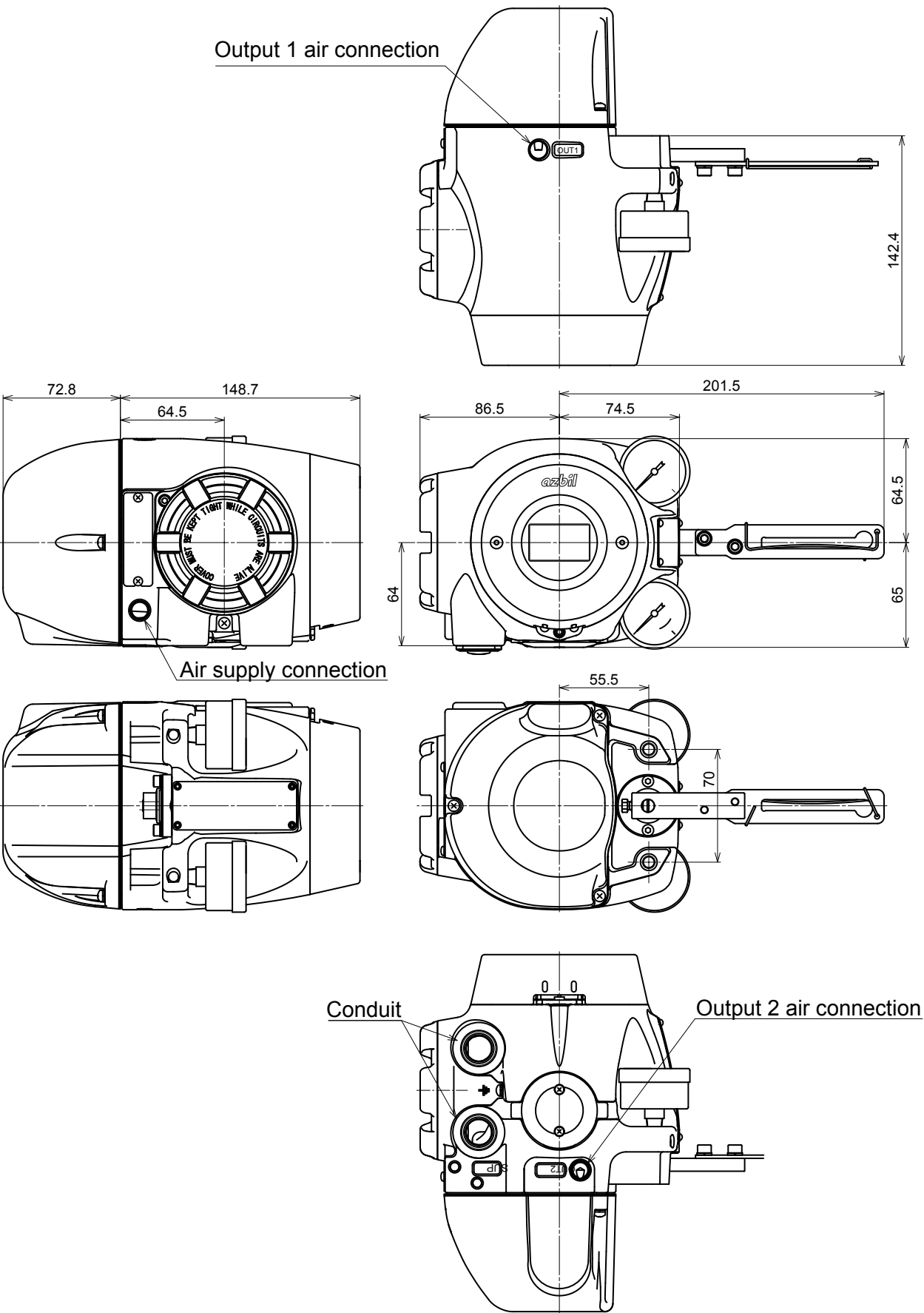


Figure 2 Dimensions of AVP703

Note

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- FOUNDATION is a trademark of Fieldbus Foundation.

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